

What is claimed is:

1. A method for producing a composite member by fitting and bonding a member having a dented portion which forms a fitting structure and a member having a protruded portion which forms a fitting structure and being different from the member having the dented portion, which comprises:

5 a step of uniformly spreading a fine particle material over the surface of the dented portion of the member having the dented portion, then disposing a platy or powdery hard solder so as to cover at least a part of the layer comprising the fine particle
10 and further disposing the member having the protruded portion, a step of uniformly spreading a fine particle material over the surface of the dented portion of the member having the dented portion and disposing the member having a protruded portion having
15 one or a plurality of holes in which a hard solder is inserted so that the member closely contacts with the layer comprising the fine particle material, or a step of previously preparing the member having a protruded portion at the end of which is formed a layer comprising a hard solder and a fine particle material,
20 disposing a hard solder on the surface of the dented portion of the member having the dented portion and disposing thereon the member having the protruded portion,

25 and a step of heating them to a given temperature under application of pressure to melt the hard solder and impregnating the fine particle material with this molten hard solder to form a bonding layer comprising the hard solder and the fine particle material, thereby to bond the different members through the fitting structure.

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2. A method according to claim 1, wherein the step of disposing the member having a protruded portion comprises uniformly spreading the fine particle material over the surface of the dented portion of the member having the dented portion, then disposing the platy or powdery hard solder so as to cover at least one part of the layer comprising the fine particle and further disposing the member having the protruded portion.

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3. A method according to claim 1, wherein the step of disposing the member having a protruded portion comprises uniformly spreading the fine particle material over the surface of the dented portion of the member having the dented portion and disposing the member having the protruded portion having one or plurality of holes in which a hard solder is inserted, so that the member closely contacts with the layer comprising the fine particle material.

4. A method according to claim 1, wherein the step of disposing the member having a protruded portion comprises previously preparing the member having the protruded portion at the end of which is formed a layer comprising a hard solder and a fine particle material, disposing a hard solder on the surface of the dented portion of the member having the dented portion and disposing thereon the member having the protruded portion.

5. A method according to claim 1, wherein at least one of the different members is a ceramic member.

6. A method according to claim 1, wherein one of the different members is a ceramic member and another is a metal member.

7. A method according to claim 1, wherein the fine

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particles are a fine particle material which reduces thermal stress.

8. A method according to claim 1, wherein a base metal of the hard solder is Au, Ag, Cu, Pd, Al or Ni, and the fine particle
5 material is ceramic fine particles, cermet fine particles or low-expansion metal fine particles.

9. A method according to claim 1, wherein the fine particle material is ceramic fine particles the surface of which is coated with a metal by plating or sputtering.

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10 10. A composite member comprising a member having a dented portion which forms a fitting structure and a member having a protruded portion which forms a fitting structure and being different from the member having the dented portion, said different members being fitted to each other and bonded with a
15 bonding layer comprising a fine particle material and a hard solder.

11. A composite member according to claim 10, wherein at least one of the two or more different members is a ceramic member.

12. A composite member according to claim 10, wherein the
20 two or more different members are combination of a metal member and a ceramic member.

13. A composite member according to claim 10, wherein the fine particles are a fine particle material which reduces thermal stress.

25 14. A composite member according to claim 10, wherein a base metal of the hard solder is Au, Ag, Cu, Pd, Al or Ni, and the fine particle material is ceramic fine particles, cermet fine particles or low-expansion metal fine particles.

15. A composite member according to claim 10, wherein the fine particle material is ceramic fine particles the surface of which is coated with a metal by plating or sputtering.

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